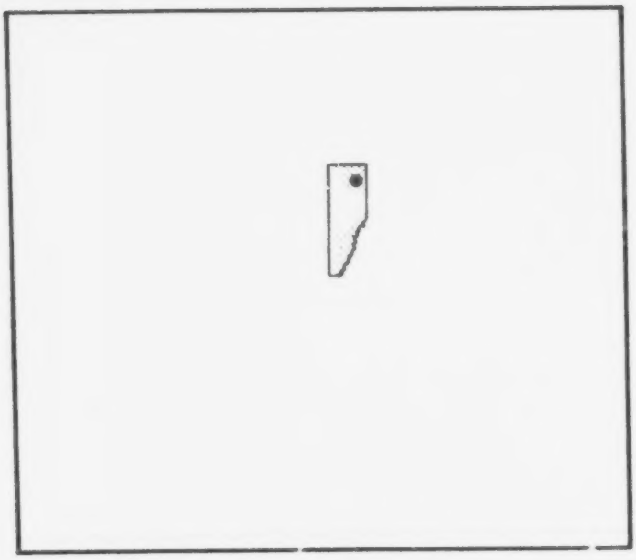
FLOOD INSURANCE STUDY

CITY OF EDGEWATER, COLORADO
JEFFERSON COUNTY



AUGUST 15, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 080089

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
CITY OF EDGEWATER, JEFFERSON COUNTY, COLORADO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Edgewater, Jefferson County, Colorado, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

This Flood Insurance Study was prepared by compiling pertinent information for the flood hazard areas in the City of Edgewater from existing technical and/or scientific data originally prepared by others for purposes other than those of the NFIP. These existing data were reviewed by the Federal Emergency Management Agency (FEMA) prior to its use in the development of this Flood Insurance Study to ensure compliance with NFIP regulations.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by URS Corporation and completed in December 1986 and 1977 (References 1 and 2).

1.3 Coordination

On September 22, 1988, the results of this study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the City of Edgewater, Jefferson County, Colorado. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected based on the extent and validity of available existing hydrologic and hydraulic data.

The area studied by detailed methods includes the Edgewater area west of Sloans Lake. The stormwater channel, from the west side of Sheridan Boulevard approximately 600 feet south of 20th Avenue upstream to 20th Avenue and Ingalls Street, a reach of approximately 3,580 feet, was studied. Also studied by detailed methods was an area located upstream of Ingalls Street and 20th Avenue to 25th Avenue which is located approximately 750 feet west of Pierce Street, a reach of approximately 5,100 feet. This area is made up of primarily irregular and poorly defined channels.

North of the detailed study area, approximate methods of analysis were used to study another sub-basin adjacent to Sloans Lake with the resulting floodplain for this area being not as well defined because of the poorly defined channels in the areas of street and overland flow upstream of Depew Street (Reference 2).

2.2 Community Description

The City of Edgewater is located on gently rolling land in eastern Jefferson County, Colorado, and is bordered by the City of Wheat Ridge to the north, the City of Lakewood to the west and south, and the City and County of Denver to the east. Edgewater is immediately west of Sloans Lake, a park in the City of Denver.

The City of Edgewater is fully developed with the exception of a few areas of vacant land. According to the U.S. Bureau of Census, the population of Edgewater increased from 4,910 in 1970 to 5,714 in 1980 (Reference 3).

Elevations in Edgewater range from approximately 5,200 feet to approximately 5,500 feet. With its location in Colorado, Edgewater experiences large fluctuations in temperature from summer to winter, and rapid weather changes due to storms traveling easterly through the region. The mountains to the west effectively block atmospheric moisture originating in the Pacific Ocean and leave the area dependent on moisture from the Gulf of Mexico, which does not consistently reach the region. Consequently, the region is dry with low variable amounts of precipitation throughout the year, although mean annual precipitation in the area of study is approximately 16 inches. From April to October, approximately 40 percent of the normal annual precipitation occurs as rain, generally from thunderstorms. From November to March, the

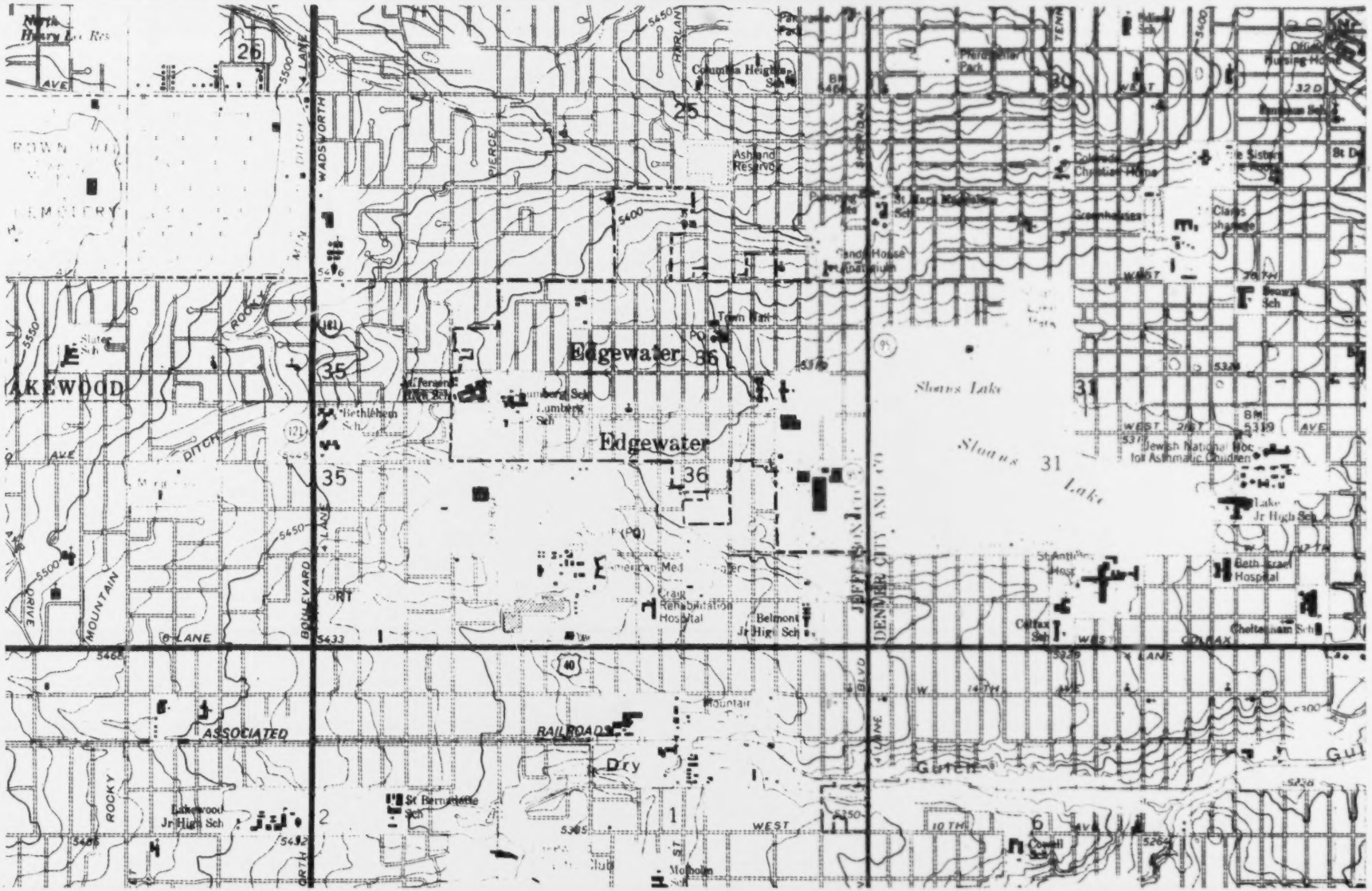

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EDGEWATER, CO
JEFFERSON COUNTY

APPROXIMATE SCALE

2000 0 2000 4000 6000 FEET

VICINITY MAP

remaining 60 percent of the precipitation occurs as snow. The small amounts of water in the air are accompanied by a large percentage of sunshine and sizable temperature changes from day to night.

Winters in the study area are long and cold, with mean daily temperatures of approximately 30°F. Summers are hot and mild with mean daily temperatures near the mid 70s (References 4 and 5). The soils in the area are generally deep, well-drained, clayey soils that are neutral or mildly alkaline (Reference 6).

2.3 Principal Flood Problems

Flood problems within the Sloans Lake subbasin in the City of Edgewater are due to overflow from the drainageway between Ingalls Street and 20th Avenue to the eastern corporate limits at Depew Street. Upstream of Ingalls Street and 20th Avenue to the western corporate limits, overflow is split between a storm sewer and the streets. Flooding in this area is caused in part by thunderstorms during the spring, perpetuated by antecedent ground moisture and melting snow.

2.4 Flood Protection Measures

The City of Edgewater, in conjunction with the City of Lakewood and City and County of Denver, permitted the Denver Urban Drainage and Flood Control District (UD&FCD) to plan and implement channel and culvert improvements in 1977. The UD&FCD constructed the West 18th Avenue extension channel from Depew Street to Sheridan Boulevard. To improve the efficiency of bridge culverts at Depew Street and Sheridan Boulevard, the UD&FCD installed twin 12- by 5-feet culverts at Depew Street and four 7- by 5-feet precast-concrete boxes at Sheridan Boulevard. All construction was completed by early 1983. The newly installed culverts relieve bottleneck conditions caused by inundation. In 1987, channel improvements between Ingalls Street and 20th Avenue to Depew Street were completed. A detention pond outside the corporate limits at 25th Avenue and Wadsworth Street reduces sheetflow east of Pierce Street.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. The flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. The event, commonly termed the 100-year flood, has a 1-percent chance of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average score period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year.

The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

The City of Edgewater is immediately west of Sloans Lake. The area between Sheridan Boulevard and Depew Street has a major drainageway resulting from a 2.07-square-mile tributary drainage basin flowing 3.4 miles easterly through it. The total basin area, including the 2.07-square-mile area, is 5.48 square miles. There is a stormwater channel from Ingalls Street and 20th Avenue to Depew Street.

Peak discharges of 1,070 cubic feet per second (cfs) for the 25-year flood were originally used to check "as-built" design conditions for the drainageway between Depew Street and Sheridan Boulevard. This flow revealed similarities and differences between past and present conditions in the area (Reference 7). The regulatory 100-year discharge was applied to establish floodplain delineations. Findings indicate the 100-year flood is contained within the improved channel between Depew Street and Sheridan Boulevard. The UD&FCD hydrologic design point is located at the intersection of the West 18th Avenue extension and Sheridan Boulevard, and hydrographs of various frequencies have been generalized at this point.

The improved stormwater channel upstream of Depew Street, storm sewers, and the detention pond at 20th Avenue and Wadsworth Street reduce peak flows through conveyance and detention of stormwater. This is reflected in lower 100-year discharge values than those published in earlier reports (Reference 1).

Peak discharge-drainage area relationships for the Sloans Lake Basin Drainage are shown in Table 1.

TABLE 1. SUMMARY OF 100-YEAR DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (cfs) 100-YEAR
Sloans Lake Basin Drainage		
West 18th Avenue at Sheridan Boulevard	2.07	1,075
West 20th Avenue at Ingalls Street	N/A	1,000
West 20th Avenue at Kendall Street	N/A	820
West 20th Avenue at Newland Street	N/A	670
25th Avenue at Pierce Street	N/A	350

N/A - Not Available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the riverine sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The drainageway between Depew Street and Sheridan Boulevard was studied to provide estimates of the elevation of the 100-year flood. For these flooding sources, other than shallow flooding areas, water-surface elevations for floods of selected recurrence intervals were computed through use of the U.S. Army Corps of Engineers HEC-2 Step-backwater Program. For the program, current topographic data were taken from a topographic map with 1-foot contour intervals prepared by Greiner Engineering Sciences, Inc., and checked to ensure conformance with national mapping standards (Reference 6). Field surveying was also conducted by Wright Water Engineers. From this topographic map, a total of fifteen cross sections were digitized and used as data for the computer analysis. An analysis of flow in the stormwater channel between Ingalls Street and Depew Street is based on the Manning Equation to estimate normal depth. A step backwater analysis was used where necessary to reflect obstructions, such as culverts. Where bends occur in the channel, superelevation of the flow has been calculated and included in the water-surface elevations. Culverts have been analyzed to determine the control condition, inlet or outlet control.

Because of irregular and poorly defined channels for street and overland flows in the area upstream of Ingalls Street and 20th Avenue, the resulting 100-year floodplain for this area is not as well defined. Updated aerial mapping was used to determine "channel" cross sections and water-surface elevations in this area.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). Channel roughness values (Manning's "n") used in the hydraulic computations were chosen on the basis of engineering judgment and field observation of floodplain areas. After consideration of movable bed conditions on the channel bottom, indicating the potential for sediment movement, a conservative value of 0.035 was adopted for the main drainageway. Roughness values for the main channel ranged from 0.015 to 0.035, and the values for the overbank areas ranged from 0.030 to 0.100. Starting water-surface elevation for Upper Sloans Lake Drainageway on the Sloans Lake water-surface elevation developed from the 100-year hydrograph volumes of various subdrainages and the stage-versus-storage relationships of the Lake.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. For each stream studied by detailed methods, the boundaries of the 100-year floodplain have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:100, with a contour interval of 1 foot (References 1 and 7).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (FIRM). On this map, the 100-year floodplain boundary corresponds to the boundary of the area of special flood hazards (Zone AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

A floodway was not calculated for the flooding source studied.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplains, and the locations of selected cross sections used in the hydraulic analysis.

7.0 OTHER STUDIES

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic data, and utilizing technical and scientific data prepared by other organizations originally for purposes other than those of the NFIP. The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the NFIP. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267 for consideration in revising of this study.

A Flood Hazard Boundary Map (FHBM) has been published for the community (Reference 8). The differences between the FHBM and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

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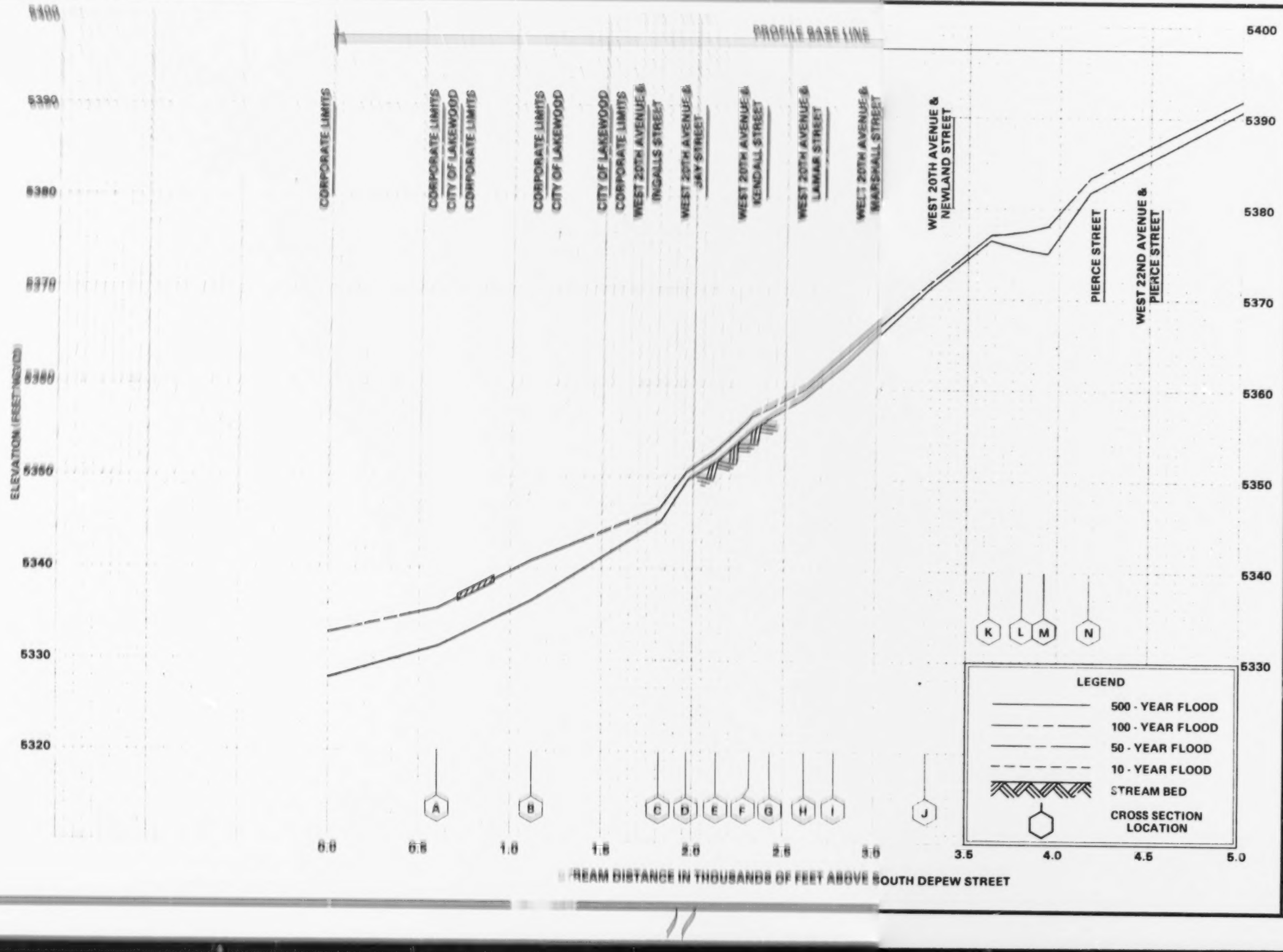


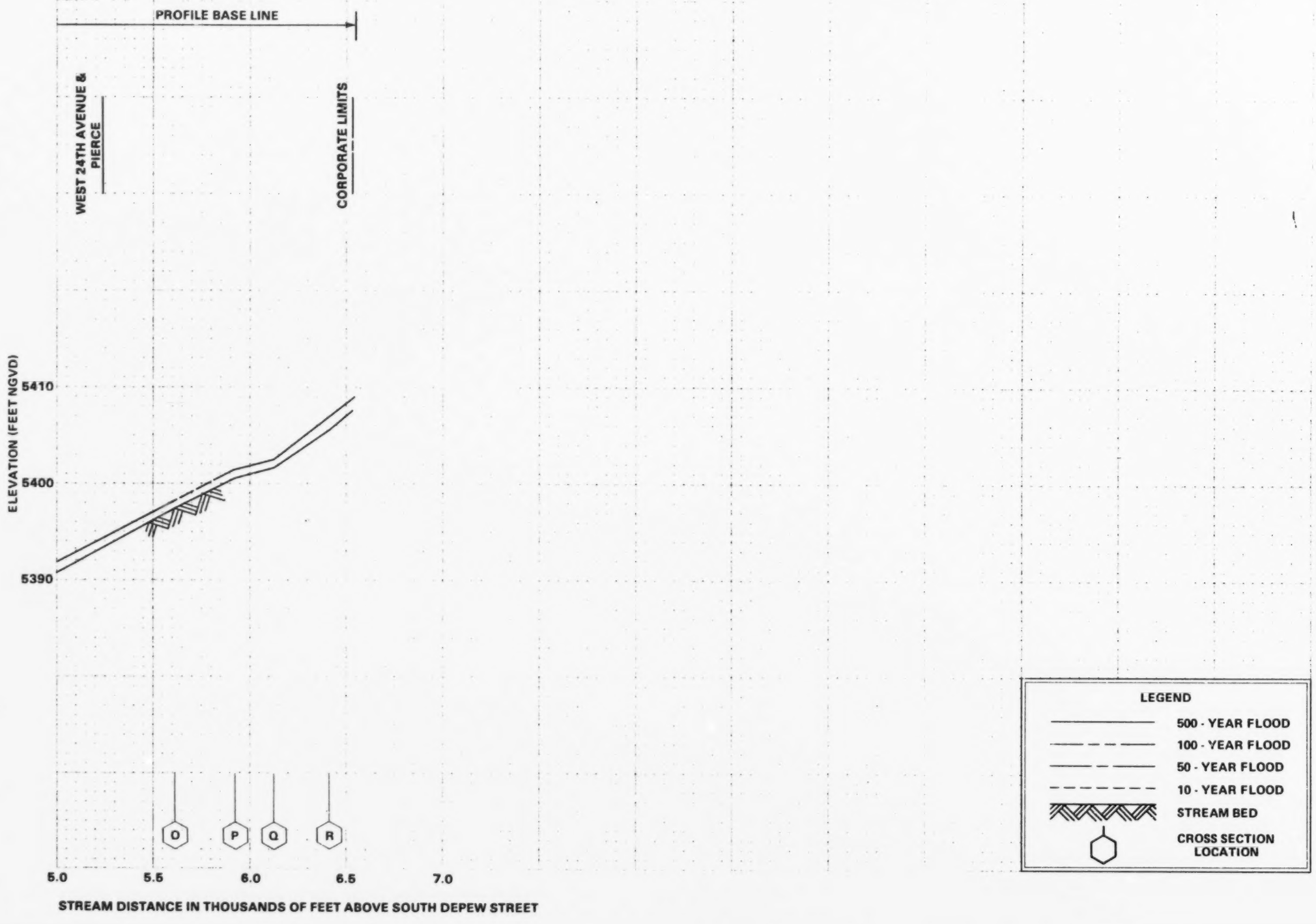
FLOOD PROFILES

UPPER SLOANS LAKE BASIN DRAINAGEWAY

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EDGEWATER, CO
(JEFFERSON CO.)

01P



FLOOD PROFILES

UPPER SLOANS LAKE BASIN DRAINAGEWAY

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF EDGEWATER, CO
(JEFFERSON CO.)

02P